



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/522,850	01/28/2005	Jun Jiao	3005-66286-03	1884
24197	7590	04/27/2006	EXAMINER	
KLARQUIST SPARKMAN, LLP 121 SW SALMON STREET SUITE 1600 PORTLAND, OR 97204			MILLER, DANIEL H	
			ART UNIT	PAPER NUMBER
			1775	

DATE MAILED: 04/27/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

21

<b>Office Action Summary</b>	<b>Application No.</b> 10/522,850	<b>Applicant(s)</b> JIAO ET AL.	
	<b>Examiner</b> Daniel Miller	<b>Art Unit</b> 1775	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on Jan 17, 2005.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-48 is/are pending in the application.
- 4a) Of the above claim(s) 30-48 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-29 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date <u>Jan. 28, 2005</u> | 6) <input type="checkbox"/> Other: _____  |

## **DETAILED ACTION**

### ***Election/Restrictions***

1. Claims 30-47 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected method, there being no allowable generic or linking claim. Election was made **without** traverse in the reply filed on January 17, 2006.

### ***Claim Rejections - 35 USC § 102***

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1, 3, 17, 18, 22, and 27 are rejected under 35 U.S.C. 102(b) as being anticipated by Tada et al (U.S. 5,935,454).

Tada teaches a silicon substrate with silicon pillars (3). The silicon pillars have reaction products (4) and nucleation sites (2) thereon which are considered nanoscale structures (see col. 6, lines 54-60). Regarding claims 3, 17, 18, the pillars comprise silicon, as does the substrate. Regarding claim 22, multiple pillars may be present as shown in the figures. Regarding claim 27, the pillars have a diameter of 7-17 nm.

Art Unit: 1775

3. Claims 1-4, 6-8, and 17-19 are rejected under 35 U.S.C. 102(a) as being anticipated by Schlaf et al (U.S. 6,871,528).

Schlaf teaches an atomic force microscope comprising a cantilever substrate having a tip extending therefrom. This tip includes a catalyst material at the apex thereof for formation of carbon nanotubes. Regarding claims 4, 6, and 7, the pillar includes catalyst material of Ni, Co, Fe, and the pillar may also include Pt (column 3 line 46-49, and column 5 line 22-40).

4. Claims 1-6, 8, 17-19, 22, 26, and 27 are rejected under 35 U.S.C. 102(e) as being anticipated by Dai et al (U.S. 6,346,189).

Dai teaches a substrate including multiple islands (pillars) of iron nitrate from which carbon nanotubes are formed. The substrate may comprise silicon, quartz, silica, or silicon nitride. The islands comprise iron (iron nitrate). Regarding claim 5, Figure 6 shows an electronic device made by locating the island close to a patterned metal pad (see abstract and drawings). Regarding claim 26, conductive lines can provide electrical connections to the islands and nanotubes and is considered a circuit. Regarding claim 27, the islands have a range of 1-5 microns in size.

***Claim Rejections - 35 USC § 103***

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 15-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Schlaf or Dai in view of Mancevski (U.S. 6,146,227).

7. Schlaf and Dai are silent as to the diameter of the carbon nanotube grown on the pillar.

8. Mancevski teaches a similar device (AFM), where the nanotubes are 10 nm, within applicants claimed range (column 7 line 35-40)

9. However it would be obvious to a person of ordinary skill in the art to use the same diameter nanotube in order to optimize the sensitivity and strength of the AFM probe.

10. Claims 20-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Schlaf or Dai or Tada in view of Li et al (U.S. 6,831,017 B1).

11. The above-taught references are silent as to the nanostructure of claim 1 and 22 being a ZnO nanowire.

Art Unit: 1775

12. Li teaches an array useful as sensor equipment or emitters for a display device (column 11 line 62-68). The device comprises a substrate with a catalyst layer and the array of ZnO nanowire (abstract and figure 1B). LI also teaches that the ZnO nanowires are a known substitute for carbon nanotubes used in above references (column 5 line 5-25).

13. It would have been obvious to one of ordinary skill in the art to modify the above teachings with the nanowires of Li since Li teaches that ZnO nanowires are a known substitute for carbon nanotubes in sensor ands emitter devices.

14. Claims 1, 9-10, 14, 22-26 and 28-29 rejected under 35 U.S.C. 103(a) as being unpatentable over Dai in view of Akiyama (U.S. 6,914,372 ).

15. Dai, discussed above is silent as to its use as an emitter for a display device.

16. Akiyama teaches a field emitter for a display device (abstract) comprising a substrate with the surface patterned (which could be a pillar) with a catalyst (abstract). The substrate has nanotube on patterned areas (abstract and figures). Akiyama further discloses that it is known in the art to use of Tungsten tipped emitters and carbon nanotube emitters (column 1 line 45-55). Regarding claim 25, the emitters can comprise ZnO whiskers (nanorods) (column 28 line 24-31). Regarding claim 26, the whiskers help to form a gate electrode (column 28 line 35-45).

17. Therefore it would have been obvious to one of ordinary skill in the art to use a tungsten tipped (or doped) nanotube as an emitter in the manner as applicant claims

Art Unit: 1775

because both tungsten and carbon nanotubes are used for the same purpose and their combinations would be predictably advantageous.

18. Claims 11 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dai in view of Brown (U.S. 6,297,063).

19. Dai, discussed above is silent as to the nanotube structure being used as a transistor with at least two terminals

20. Brown teaches a nanotube (wire) used as a transistor with at least two terminals

21. Therefore it would have been obvious to one of ordinary skill in the art to modify Dai with Brown because they have similar structures.

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Daniel Miller whose telephone number is (571) 272-1534. The examiner can normally be reached on M-F.


If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Deborah Jones can be reached on (571) 272-1535. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 1775

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Daniel Miller



**JENNIFER MCNEIL**  
**PRIMARY EXAMINER**  
2/21/06